The Management University of Africa

Sponsored by the Kenya Institute of Management

**POST GRADUATE UNIVERSITY EXAMINATIONS**

**SCHOOL OF MANAGEMENT AND LEADERSHIP**

**DEGREE OF MASTER OF MANAGEMENT AND LEADERSHIP/ MASTER OF BUSINESS ADMINISTRATION**

**MML 5102/MBA 505:** **STATISTICAL DECISION ANALYSIS/QUANTITATIVE METHODS FOR BUSINESS**

***DATE:*** ***5TH DECEMBER 2016***

**DURATION: 3 HOURS**

**MAXIMUM MARKS: 60**

**INSTRUCTIONS:**

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **FOUR (4)** questions.
4. Question **ONE is compulsory.**
5. Answer any other **TWO** questions.
6. Question **ONE** carries **30 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided**

**QUESTION ONE**

a) Measurement is an important activity in Statistical Decision Analysis.

i. Describe the role of scale of measurement in business research **[2 Marks]**

ii. Explain three scales commonly used to measure research variables

**[6 Marks]**

b) A final year MML student at MUA intends to conduct research for her final thesis focusing on Small and Medium Enterprises (SMEs) in the manufacturing sector in Nairobi County. She has established from the Kenya Association of Manufacturers (KAM) register of December 2014, that there are 1,500 registered SME members of KAM. The student intends to use the KAM register as her sampling frame and has determined using Cochran's (1977) sampling formula that a sample of 250 is appropriate for her study. Table 1.1 shows the distribution of manufacturing SMEs in the various subsectorsin the KAM register.

**Table 1.1 – Number of manufacturing SMEs by subsector**

| Subsector | Number of SMEs | Minimum Sample |
|---|---|---|
| Building and Construction | 290 | |
| Chemical and Allied | 250 | |
| Energy, Electrical and Electronics | 310 | |
| Food and Beverage | 320 | |
| Leather and Footwear | 80 | |
| Metal and Allied | 50 | |
| Textile and Apparels | 90 | |
| Timber and Furniture | 110 | |

**Required:** Using proportional stratified random sampling technique, assist the student determine and populate Table 1.1 with the respective minimum sample SMEs for each subsector to include in her study **[8 marks]**

c) Explain the following pairs of terms as they are applied in statistical analysis:

i. Consumer Price Index and Consumer Quantity Index **[1 Mark]**

ii. Null Hypothesis and Alternative hypothesis **[1 Mark]**

iii. Expected Monetary Value (EMV) and Probability **[1 Mark]**

d) A Fast Moving Consumer Goods (FMCG) company in Kenya is evaluating three new products A, B, and C. The company has determined that the market environment after the product launch may experience three different conditions with different likelihoods. Table 1.2 shows the values for each product and probabilities under each state respectively.

**Table 1.2 – Product values, market conditions, and probabilities**

| Conditions | Boom | Steady state | Recession |
|---|---|---|---|
| Product A | +8 | +1 | -10 |
| Product B | -2 | +6 | +12 |
| Product C | +16 | 0 | -26 |
| Probabilities | 0.6 | 0.3 | 0.1 |

**Required:**

i. Rank the three projects using the Expected Value (EV) rule (show all your workings) **[3 Marks]**

ii. Rank the three projects using the Maximin rule **[2 Marks]**

iii. Rank the three projects using the Maximax rule **[2 Marks]**

e) With use of appropriate examples, distinguish between experiment research and correlational research methods **[4 Marks]**

## QUESTION TWO

**a)** Critically discuss time series data and cross sectional data clearly explaining the main differences between the two **[4 Marks]**

b) An experimental farm intends to determine how wheat yield (Y) depends on amount of fertilizer (X) used. The farm manager has obtained funding for seven experimental trials. The observation for each trial is given in Table 2.1.

**Table 2.1 - Details for the trials**

| Trial | Fertilizer (X) used | Wheat Yield (Y) |
|---|---|---|
| 1 | 100 | 40 |
| 2 | 200 | 50 |
| 3 | 300 | 50 |
| 4 | 400 | 70 |
| 5 | 500 | 65 |
| 6 | 600 | 65 |
| 7 | 700 | 80 |

**Required:**

i. Calculate the mean values for fertilizer and wheat yield respectively **[1 Marks]**

ii. Calculate the deviation for each pair of observation and the total deviation for fertilizer and wheat yield respectively **[1 Marks]**

iii. Determine the correlation coefficient between fertilizer and wheat yield **[3 Marks]**

iv. Estimate the regression line (equation) of fertilizer against the wheat yield **[3 Marks]**

c) Explain three circumstances under which it is most appropriate to use a sample as opposed to a whole population when undertaking business research. **[3 Marks]**

## QUESTION THREE

a) Distinguish between standard deviation and standard error of a sample **[2marks]**

b) Analyse each of the following cases then suggest and explain the most appropriate sampling technique that best suits each of the case:

i. A town of 340,000 people is considering enacting a law to ban smoking in all licensed five star restaurants. The town management authority

committee wants to find out what the whole town thinks of this new law. The committee selects a sample of 1460 in the town to survey **[2 marks]**

ii. The national government intends to randomly select 10 of the 47 counties in Kenya and to carry out a survey on the performance of all parastatals in every county selected. **[2 marks]**

iii. A 400 bed capacity hospital wants to randomly select 20 out of its 50 wards and then randomly select 10 patients from each of the 20 wards for a satisfaction survey. **[2 marks]**

c) The United States of America (USA) Food and Drug Administration (FDA) department requires that whole fresh water fish imports have a mean body weight ($\mu$) of 170 Kgs and a standard deviation ($\sigma$) of 40 kgs. Adrian, a fisherman from Kavirondo gulf is writing a proposal to export Mbuta fish to USA. He realizes that there are many different species of Mbuta and takes samples of 64 fish from each species. When Adrian calculates the mean body weight for each species, he obtains a mean ($\bar{x}$) of 173 for the first sample and a mean ($\bar{x}$) of 185 for the second sample. Adrian wants to determine whether the two mean body weights ($\mu$) are different from the FDA specifications of 170 Kgs.

**Required:**

i. State the null and alternative hypotheses for the problem **[1 mark]**

ii. Calculate the standard errors (SEx) of the two-sample means **[1 mark]**

iii. Calculate the Zstatistics (Zstat) for the first sample mean ($\dot{X}$ =173) and the second sample mean ($\dot{X}$=185) respectively **[2 marks]**

iv. Use normal distribution tables to determine the p-values of the Zstat for the sample mean ($\dot{X}$) =173 and for the sample mean ($\dot{X}$) =185? **[2 marks]**

v. Advise Adrian which of the two samples closely represents the current weight of the Mbuta population in Kavirondo gulf and hence to include in his proposal? **[1 mark]**

## QUESTION FOUR

a) Describe two advantages and two disadvantages of using Expected Value EV as a decision criterion? **[4 marks]**

b) Explain the difference between mode and median values of a distribution and state their application in descriptive statistics **[4 marks]**

c) Southlink, a research company in Kenya conducted a survey on holiday makers in Mombasa using the questionnaire method. Analysis of the questionnaires showed that 0.75 of the holiday makers classified their holiday as good. The probability of hot weather in Mombasa is 0.6 and the probability of regarding the holiday as good given hot weather is 0.9. Determine the probability that there was hot weather if a holiday maker considers his holiday good? Show all your workings. **[4 marks]**

d) Define multiple regression and non-linear regression and clearly explain their application in making business decisions **[3 marks]**